CUMULATIVE IMPACTS ANALYSIS
DAVIESS COUNTY, KENTUCKY
Joes Run South Mine Site

Introduction

This document will use terminology following current EIS guidance. An impact, or effect, means the change or modification to an environmental resource brought about by an outside action. Impacts can, and will, vary in significance, magnitude, and duration. Impacts may also be beneficial or adverse depending on the action and resource affected. For this analysis, short-term impacts are those with effects evident for a few years, generally less than the lifetime of the project (*e.g.* ground clearing activities). Long-term impacts generally would be those with effects extending beyond the lifetime of the project (*i.e.* beyond reclamation). Impact magnitude will be defined as follows: major impacts could cause significant change, stress, or depletion to an environmental resource, potentially resulting in irretrievable loss; moderate impacts could cause some change in a resource, generally with readily apparent effects; minor impacts are those that are detectable but slight; negligible impacts are those at the lower limit of detection causing insignificant change or stress to resources; and no impact applies to a level at which no discernable or measurable impacts are observed. In cases where quantitative resource evaluation was not possible, analyses were based on best available information and professional judgment. (Office of Surface Mining, 2006).

The proposed project area, also referred to as the Joes Run South Mine site, has a footprint of approximately 199 acres; however, the cumulative impact analysis has been expanded to the 12-digit HUC watershed it lies within. The "Review Area" refers to Joe's Branch-North Fork Panther Creek, HUC 051100050305, and area of approximately 48.7 mi^2 (Exhibit 1). Few data, other than coal severance tax records, are available prior to the advent of SMCRA permitting in the late 1970's. As a result, much of the discussion of past impacts is qualitative. Current and future impacts are based upon the best available data for resources of concern, but still involve a degree of speculation. Cumulative impacts were considered based upon present-day baseline conditions defined. The future time boundary of the analysis is determined by the release of project areas from agency oversight. The estimated lifetime of the project is five years, and an additional five years for reclamation and bond release of the mine areas will be assessed. Therefore, the cumulative impacts analysis will focus on a period of earliest available data for each resource to ten years after mining begins, and will refer to this timeframe as the "Review Period" for the remainder of the document.

Baseline Conditions

Landuse data were extracted from the NRCS National Landcover Database 2001 raster dataset. Rasters were converted to polygon shapefiles in ArcGIS 9.3.1, clipped to the Review Area extents, and totals of each landcover were tabulated. Landcover classifications were then spot-checked against USDA NAIP 2010 aerial imagery and found to be accurate. From these data, it is obvious that anthropogenic landuse changes have impacted most of the landscape (Exhibit 2). Despite this, a large forested area with some connectivity among forest blocks remains in higher-relief areas along the eastern edge of the Review Area. Forest still covers 34% of the Review Area

(approximately 10,700 acres). These remaining forested areas often are connected by forested riparian corridors.

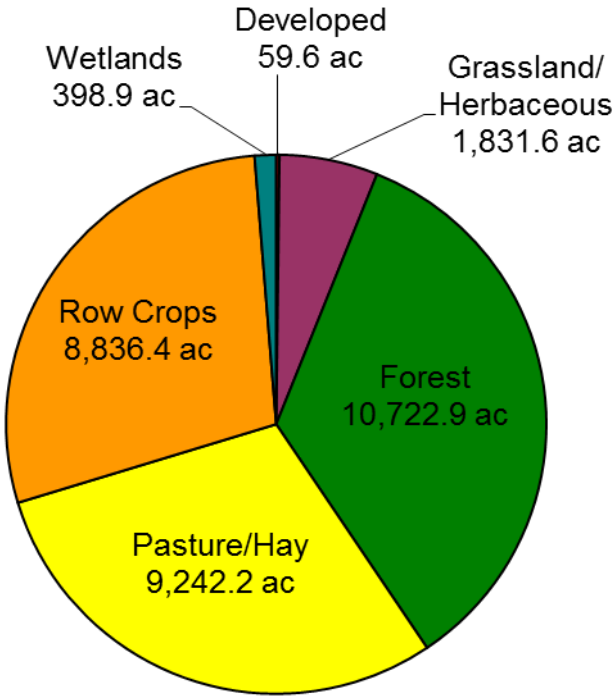

Figure 1. Review Area landcover totals. Data extracted from USGS NLCD 2006 dataset.

Agriculture has been extremely important to the economy of the region, and remains a significant source of employment and revenue, though to a lesser degree than historically. Still, the large areas cleared for pasture or row crops have converted much of the review area (approximately 57%) to agricultural use. Cultivated agricultural land occupies 28% of the Review Area (approximately 8,800 acres), with production dominated by soybeans and corn (US Department of Agriculture, 2002).

Resource extraction is a relatively minor agent of landuse change (Exhibit 3). Although mining has long been practiced in the Review Area, data for activities prior to the passage of SMCRA sometimes are sparse. Data presented in Exhibit 3 are drawn from surface mined areas indicated on USGS topographic maps (1953a, 1953b, 1967, 1973), historic mine data compiled by the Kentucky Commerce Cabinet (EEC, 2012), modern permitting data from the Kentucky Division of Mine Permits (SMIS, 2012; KMMI; 2012), and proprietary data from Western Kentucky Minerals. Only 23 mine permits have been issued in the Review Area. Of these, three are actively producing coal, one is in Phase 2 bond release, two were bond forfeitures, and the rest have been reclaimed and have full bond release. In the previous ten years, there have been only 3 new permits issued in the Review Area. Records indicate that there were approximately 1,645 acres of the Review Area (5.1%) impacted by surface mining. Nearly all mines, even pre-law and those subject to bond forfeiture, have been reclaimed. NLCD data shows approximately

53.4 acres as barren ground; mines indicated as abandoned or bond forfeitures have groundcover established, and often are agricultural or forested areas.

Developed areas occupy less than 1% of the land surface (~60 acres) and consist of mining infrastructure. Grasslands occupy 5.8% of the area (approximately 1,800 acres) and is a result of either agricultural development or mine reclamation. Open water, scrub/shrub, and barren land represent other minor landcovers, and often are the result of land manipulation related to agricultural activities.

Wetlands, both natural and manmade, represent the remaining 1.3% (or approximately 400 acres) of the Review Area (NLCD, 2006). For this CIA, an intersect analysis of hydric soil map units versus NWI wetland polygons (excluding Cowardin classifications representing open water) was run in ArcGIS 9.3.1. Results suggest of potentially 8,327 acres of wetland in the Review Area, approximately 400 acres remain, a loss of approximately 95% (Exhibit 3). This exceeds the approximately 80%-85% loss estimated for the state as a whole but is comparable to other heavy agriculture areas. Much of this occurred during early settlement and later under the Swampbuster Act; however, losses continued even after passage of the Clean Water Act, with removal of approximately 1.8% of the remaining wetland area annually (Dahl and Johnson, 1991). From 1998 to 2006, declines have been approximately 0.5% for marshes (~0.08% annually) but increases of 1.1% (~0.2% annually) have been seen in forested wetlands as scrub-shrub areas mature. Relatively large overall wetland increases are inflated by construction of ponds and may mask an overall loss of wetland function (Dahl, 2006). Remaining wetland area is primarily palustrine forested, with minor contributions from palustrine scrub-shrub, emergent, and aquatic bed wetlands (Table 1).

Table 1. Baseline wetland resources in Review Area.

Cowardin Classification	Number of Water Bodies	Acreage*
Palustrine Forested	40	365.4
Palustrine Scrub-Shrub	6	22.4
Palustrine Emergent	5	5.1
Palustrine Aquatic Bed	2	0.5
Lacustrine Fringe	1	1.3
Pond Fringe	368	229.3
Total:	**422**	**624.0**

**Note all fringe wetland classifications excluded from spatial analyses*

This analysis was extended to compare wetland loss due to the two dominant agents of landuse change, agriculture and surface mining. The extents of both were run in a second intersect analysis versus original wetland extent. This indicates agriculture has impacted 6,006 acres of wetland, approximately sixty times as much mining (106 acres) (Exhibit 4).

Streams also have been impacted by previous landuses. Examination of the NHD dataset (USGS, 2012), topographic maps (USGS 1953a, 1953b, 1967, 1973), and aerial photos (USGS, 2010) show significant stream channelization in the agricultural areas in the central and western portions of the Review Area. Higher relief areas and forested

regions tent to exhibit streams with more sinuosity. Stream hydrology and riparian zones in agricultural areas also have been significantly impacted by agricultural development. Despite this, only three 303(d) impaired streams are found in the Review Area (Table 3, Exhibit 5)(EPPC, 2012); their impacts and sources reflect the negative environmental aspects of agricultural development.

Table 2. Baseline stream data for the Review Area.

HUC 12	Stream Type	Number of Reaches	Length (ft)
Joe's Branch/North Fork Panther Creek	Intermittent	70	250,446
	Perennial	101	414,956

Table 3. Designated use support of monitored streams in Review Area.

HUC 12	Stream Name	Status	Impairment	Source	Length (mi)
Joe's Branch/North Fork Panther Creek	Joe's Run	Partial Support	Habitat Alteration	Agriculture, Hydrologic Modification, Vegetation Removal	2.4
	Joe's Branch	Partial Support	Habitat Alteration, Nutrient Enrichment	Agriculture, Hydrologic Modification	3.5
	N. Fork Panther Creek	Partial Support	Habitat Alteration, Nutrient Enrichment	Agriculture, Hydrologic Modification	3.2

Future Actions

Estimates and projections of future development follow methods discussed in the Final Programmatic Environmental Impact Statement on Mountaintop Mining/Valley Fills in Appalachia issued by EPA 28 October 2005. Even though this method of mining is not utilized in Western Kentucky, the projection method is still applicable. In this method, coal mine permit information for the previous ten years was used to determine a rate of impact for that time period. Assuming this rate will continue at this level in the future, cumulative impacts were then extrapolated from the data set. This method was used in the current cumulative impacts analysis and was further applied to other potentially significant agents of change in the Review Area.

Although relatively minor in surface disturbance, mining has occurred fairly continuously in the Review Area. In addition to this proposed project, Western Kentucky Minerals has an active mine that is adjacent to this project. Considering both of these projects and an average project time span of five years, future mining is expected to progress at approximately 20 acres of surface disturbance per year (or 0.6% of the Review Area annually).

The economic impact of agriculture has been declining in the Review Area; farmland in the region has declined since 1992 (USDA 1997 & 2002). As crop production is expected to remain relatively static, future projections therefore assume no net expansion of agricultural land over the review period (although use of existing agricultural land may become more intensive). Given the low population density, residential development likely will be static. Soil data for the Review Area indicate residential and commercial development will be constrained to areas outside of much of the Impact Area, as most soils within are moderately, to very, limited for construction by flooding and shallow saturation zones (NRCS, 2012). It is expected that any development will occur around established communities such as Whitesville Based on physical limitations and the lack of historical and current commercial development within the Review Area, future commercial development is likely negligible.

There were no wetlands identified within the proposed projects permit boundary and cumulative impacts from future mining activities in the review area are expected to be minimal due to regulatory required reclamation and mitigation.

The proposed project will remove approximately 20 acres of forest cover in the Review Area, but much of this will be re-established on site during stream restoration activities, reclamation of the mine facility to fish and wildlife post mining landuse, and mitigation activities. Given the dominant role of agriculture in historic landuse conversion and its low likelihood of significant expansion, low levels of forest loss with concurrent gains as well as low levels of projected development suggest minor future forest conversion. Additionally, most extant stands of forest lie to the east of the Project Area, and contain several relatively unfragmented forest blocks, most with corridors to adjacent stands. Overall forest acreage and ecological function is expected to remain near current levels during the review period; cumulative impacts on ecological systems of concern are therefore expected to be minor.

Historically, agricultural lands in the Review Area have been protected. Agriculture is not expected to expand significantly during the review period, but farmland may be converted to residential land near urban centers. As nearly all of the Review Area is rural, development of existing farmland is expected to be minor. Mining may impact areas currently in crop production but stockpiling of prime farmland top soils and restoration of these areas to pre-mining production levels are required by Kentucky reclamation regulations (405 KAR 16:020; 16:040; 16:200). The Joes Run South Mine site has approximately 150 acres currently used for agricultural purposes.

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